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SAFETY RECORD OF MINE NO. 7, ISLAND CREEK COAL CO., HOLDEN, LOGAN COUNTY, W. VA.

BY

Alex U. Miller and C. E. Linkous

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SAFETY RECORD OF MINE NO. 7, ISLAND CREEK COAL CO., HOLDEN, LOGAN COUNTY, W. VA.[1]

By Alex U. Miller[2] and C. E. Linkous[3]

Since its beginning, the occupation of coal mining has been considered hazardous. It is true that there are hazards inherent in mining, but it is believed that most of them, at least, can be guarded against. Moreover, many man-made hazards can be eliminated by officials and workers adopting safer practices.

Notwithstanding the hazards in coal mining, the fatal accident rate in the United States has improved. During the period from 1911 to 1941, inclusive, the fatal accident rate varied from 5.35 to 2.22 per million tons of coal. With many handicaps during the war period, 1942-45, such as the lack of experienced manpower and the employment of untrained men, the increased average age of workers, and the shortage of equipment and supplies, the industry still further reduced its accident rate, so that it ranged from 2.30 to 1.72[4] deaths per millon tons of coal. During 1944, 684,000,000 tons of coal was produced with a rate of 1.91, and during 1945, 631,000,000 tons was produced with a rate of 1.72[4] deaths per millon tons of coal. The accident rate for 1945 was the lowest for the industry since records have been compiled.

For the industry to improve its record, it has been necessary for some mines to make outstanding safety records. One of these is mine No. 7 of the Island Creek Coal Co., which has had a comparatively good safety record for 10 years, 1936-35. The purpose of this publication is to show, from data furnished by the company and information collected during Federal coal-mine inspections, that a coal mine can be operated with a reasonable degree of safety, provided the management and employees recognize the fact that it can and must be done.

GENERAL INFORMATION

The No. 7 mine is on the Chesapeake & Ohio Railway at Holden, Logan County, W. Va., and is operated by the Island Creek Coal Co. The offices of the company are at Holden.

1/ The Bureau of Mines will welcome reprinting of this paper provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7365."
2/ Supervising engineer, District C, Bureau of Mines, Mount Hope, W. Va.
3/ Coal-mine inspector, Bureau of Mines.
4/ Tentative.

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The operating officials are as follows:

President	J. D. Francis	Huntington, W. Va.
Vice president	R. E. Salvati	Holden, W. Va.
General manager	J. J. Foster	Do.
Chief engineer	J. A. Saxe	Do.
Superintendent	H. H. Barber	Do.
Safety engineer	A. J. Bartlett	Do.
General mine foreman	Ralph Thompson	Do.

The mine was opened in 1910, and at the present most of the workings are 7½ miles southwest of the surface plant.

The mine is opened by four concrete-lined shafts, which range from 22 to 220 feet in depth, and three slopes. It is developed in the Cedar Grove coal bed (known locally as the Island Creek bed), which averages 72 inches in thickness in the area being mined.

Approximately 455 men are employed; 372 men work underground, and 83 work on the surface. The average daily production is 5,000 tons of coal, which is loaded by mobile loading machines. The probable life of the mine is 25 years at the present rate of production. The mine is rated as gassy by the West Virginia Department of Mines. Explosions have not occurred in this mine.

SURFACE STRUCTURES

The tipple and cleaning plant are steel and concrete structures. The coal is weighed and dumped at the slope bottom and is conveyed to the tipple by a flight conveyor. The tipple is equipped with a modern washer and an airflow dry cleaner. The floors are swept with brooms at least once during each shift, and dust collectors are installed at strategic points throughout the tipple. Provisions have been made to discharge the dust into the creek and thus eliminate the hazard from dust being carried back into the mine.

The supplies are stored in an orderly manner on shelves or on racks, and the aisles are kept free of obstructions. All stairways and platforms are provided with safe handrails, and the treads of stairways minimize the slipping hazard. Toeboards and railings are used at openings in the floors, and good clearance is provided over stairways. Good housekeeping is practiced throughout the surface plant. Illumination is furnished by well-installed incandescent lights, with the wiring in conduit. Heat is furnished from a central heating plant.

MISCELLANEOUS SURFACE CONDITIONS

Most of the mine refuse is conveyed by an aerial tramway to the refuse dump, about 2,200 feet from the tipple. Autotrucks are also used to haul some of the mine refuse.

Posts, cross bars, and other mine timber are stored in an orderly manner at safe distances from the mine openings, and the roads and paths are maintained free of obstructions.

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Suitable fire extinguishers are placed at all electrical installations; chemical fire extinguishers and barrels filled with water are placed in each surface structure. In addition, fire hydrants and hose are available at strategic points throughout the surface plant. A fire-fighting organization is maintained, and regular fire drills are held at least twice a year. Smoking is restricted in and about surface structures.

METHODS OF MINING AND TIMBERING

The room-and-pillar method of mining is followed, and some of the pillars are extracted by honeycombing. This system requires driving "butt-offs" about 20 feet in width through the pillars, leaving a 6-foot wing. A definite pillar line is not maintained in this system of mining.

Before blasting, the coal is undercut by mining machines to a depth of 7 or 8 feet; the kerf is made in the coal near the floor.

The maximum cover is 800 feet, and the immediate roof is shale. Slips and pots are encountered throughout the working sections. The floor is hard, rough shale, which tends to heave under compression.

Methods of timbering on entries vary. Roof that is considered doubtful but is not taken down is supported with posts or cross bars set 1 to 6 feet apart. A cap piece is generally placed over each post. Posts or cross bars, set on 2- to 6-foot centers, are used in working places. These are usually advanced to within 8 feet of the working faces, and safety posts are used near the working faces during cutting, drilling, and blasting operations. An adequate supply of posts, wedges, and cross bars is maintained in each section. Timbering diagrams are provided, and a written set of timbering rules has been adopted.

The employees test the roof before starting to work and frequently during the working shift, and the officials examine the roof when they visit the working faces and travel the haulage roads. The vibration method of testing roof is used in conjunction with sounding.

EXPLOSIVES AND DETONATORS

A permissible brand of explosive is used exclusively for blasting purposes, and the maximum permissible charge per hole is not exceeded. No. 6 electric detonators are used.

The explosives and detonators are placed in separate insulated cars and transported underground on the off shift. An insulating coupling is used between the locomotive and the cars containing explosives, and these cars are kept locked when unattended. Separate explosives and detonator storage boxes are maintained in each section. These boxes are placed in return airways away from the track and trolley wire and are kept locked except when explosives are being delivered or removed. Only authorized persons have access to the keys to the storage boxes.

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All blasting is done on shift; 13 shot firers are employed to charge and fire all shots. The holes are drilled after the coal is undercut, and a special effort is made to assure that the holes are drilled 6 inches less in depth than the undercut. A wooden tamping bar is used, and the charged holes are stemmed to the collar with clay. Ample warning is given before the shots are fired by calling "Fire" at least three times. Regulations require that when one place is about to cut through into another working place, special precautions must be taken to see that all persons in the immediate vicinity are in a safe place before shots are fired.

A record is kept of the amount of explosives used, returned, and on hand at the end of each shift.

VENTILATION AND MINE GASES

Two axial-flow fans used to induce ventilation in this mine deliver about 204,000 cubic feet of air a minute. They are offset from the line of the openings, and pressure-relief doors are provided. The fans are operated continuously from an independent power source.

The ventilation is coursed through the mine in seven major splits, and the old workings are ventilated by the return air. Overcasts are constructed of reinforced concrete, and the approaches are graded to offer minimum resistance to flow of air. Doors, where used, are installed in pairs to form air locks, and each door is equipped with a small window to allow persons to observe equipment approaching from the opposite direction. Stoppings between the intake and return airways are constructed of incombustible material, and room crosscuts, except the one nearest the face, are closed with brattice cloth. Line brattices are used to conduct the air from the last open crosscuts to the working faces.

Air measurements taken in the last open crosscut in each pair of entries during January 1945 were above the minimum requirement; 6,000 cubic feet of air a minute is the absolute minimum acceptable to the company.

As stated previously, the No. 7 mine is rated as gassy by the West Virginia Department of Mines. Two certified fire bosses are employed to make preshift examinations of the mine. Officials, machinemen, and drillers carry permissible-type flame safety lamps and make tests for gas when they visit the working faces. The company collects and analyzes air samples to determine the quality of the mine atmosphere. Air samples collected indicate that the mine was liberating about 550,000 cubic feet of methane every 24 hours.

CONTROL OF COAL DUST

The mechanical cutting and loading of coal are the principal sources of dust, but no large accumulations of coal dust were noted during the last inspection. The mine cars are maintained reasonably dusttight, but in some instances the coal is topped above the cars, causing spillage during transit.

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However, the fine coal is cleaned up at regular intervals. The roadways and ribs are generally dry, but water is present at some points along the haulageways.

The cutting and loading machines are equipped with sprays to allay the dust at its source. Sprays are installed also at loading points on the shuttle-car sections and at the foot of the slope. A wetting agent is used in the spray solution.

Three track-mounted machines are used to apply rock dust to the roof, ribs, and floor of haulageways and working places. The company collects and analyzes dust samples to ascertain the effectiveness of rock-dusting and to determine when redusting is necessary. The analyses of dust samples collected during the January 1945 inspection indicate that the incombustible content of the samples ranged from 77.2 to 91.0 percent.

HAULAGE

Adequate clearance is provided on both sides of railroad tracks, or warning signs are posted. Employees handling railroad cars use suitable brake sticks, railroad-type pinch bars, and safety belts.

The underground track is in good condition with respect to ballasting, grading, and alinement, and the haulageways are clean. All switches are equipped with parallel throws, which are installed on the clearance side. The clearance space, with few exceptions, is free of obstructions and considered adequate. Warning signs are posted where scant clearance exists.

The locomotives are equipped with rerailers, lifting jacks, and gongs, and the seats and floors of the cabs are covered with insulating mats. The haulage equipment is well maintained. Permissible-type trip lights are used on the rear of all pulled trips and on the front of pushed trips of three or more cars. Dispatchers are employed to direct the movements of all trips. Men are transported to and from working entries in man-trips. An official is in charge of each man-trip, and good discipline is maintained.

ELECTRICITY

Surface transformers are installed on poles at safe distances above the ground or are enclosed by substantial fences. The gates of the fences are kept locked, except when authorized persons are present. Power is purchased from the Appalachian Electric Power Co. and is received as 6,900 volts alternating current. The substations are on the surface and are constructed of stone, concrete, or sheet metal.

The power feed lines are taken into the mine through boreholes. Trolley and power feeder lines are well installed on insulators and are guarded at crossings and other places where employees are required to pass under them regularly. Cut-out switches are installed near the entrance to each section and at regular intervals along the haulage roads. Electrical equipment is of

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the permissible and nonpermissible types, but additions and replacements are of the permissible type. Telephones are maintained on each section and at strategic points along the haulage roads.

ADDITIONAL SAFEGUARDS FOR MECHANICAL EQUIPMENT

The gears and belt drives in the tipple and cleaning plant are guarded, and the repair pit in the shop is kept covered when it is not being used. The cutter chains of mining machines are provided with locking devices, and the bits are removed from the front of the cutter chains when the machines are being trammed. The loading machines are equipped with chains to lock the loading arms when the machines are not in use, and the controls of locomotives are set at neutral when they are unattended.

UNDERGROUND FIRE PREVENTION AND CONTROL

Chemical fire extinguishers are maintained on each section and at strategic points along the haulageways. Rock dust and tank cars, filled with water, are available on each section. In addition, a chemical fire truck, equipped with hose and fire extinguishers, and a supply of chemicals are maintained at a central point in the mine. A fire-fighting organization is maintained, and regular fire drills are held at least twice a year. Underground structures are of incombustible material.

MISCELLANEOUS

An up-to-date, properly marked, ventilation map is posted in the superintendent's office where it is accessible to the employees. Four escapeways are available, and signs indicating the direction to the surface openings are posted. The No. 7 mine is worked on a closed-light basis, and smoking is not permitted underground. Employees are searched frequently and in such a manner as to assure that smokers' articles are not being taken into the mine. All employees and officials wear snug-fitting clothing, protective hats, and safety-toe shoes. The checking system provides positive identification on the person of each underground employee. Good housekeeping is practiced throughout the mine.

GENERAL SAFETY CONDITIONS

All officials are certified by the West Virginia Department of Mines. Not more than 20 men are supervised by each foreman, and because the workings being concentrated the foremen visit workers many times during each shift.

A safety director and four inspectors are employed for this and other mines of the company, and an active safety department is maintained. All accidents are investigated, whether involving injury to persons or otherwise. A record is kept of all accidents. Data are summarized monthly and annually and are studied to make corrections to prevent similar occurrences. Haulage and handling materials have caused most of the injuries at this mine.

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Safety meetings for officials are held twice a month. In addition, considerable time is devoted to individual workers, as the company places special emphasis on personal contact.

Special company rules on safety have been adopted and are available in booklet form. Each employee is furnished a copy of the rules and a copy of the mining law. New employees are instructed in the safe procedure of performing their particular types of work and are warned also of the hazards incident to their occupations.

Attractive bulletin boards are maintained, and the posters are changed weekly to keep employees interested; safety literature is issued to each employee monthly.

Approximately 5 percent of the employees received additional first-aid training during 1945. One hundred men have received mine rescue training. First-aid material is available on each section and on the surface, and the mine has access to a company-owned mine rescue station which is about 1 mile from the mine. All persons going underground carry self-rescuers, and they have been trained in their use and limitations. The company maintains a modern hospital about ½ mile from the mine.

DISCUSSION OF ACCIDENT DATA

Accident data show that during the 10-year period 1936 to 1945, inclusive, 5 fatalities occurred while producing 11,273,675 tons of coal, or 2,254,735 tons per fatality. This is approximately four times the average coal production per fatal accident for the United States.

During the period from May 4, 1942, to May 31, 1945, the mine worked 3,156,070 man-hours and produced 4,910,687 tons of coal without a fatality - a very good record.

During the 10-year period, the tons per lost-time injury ranged from 16,278 to 268,193, with an average for the period of 86,265. This average tonnage is about seven times that of the industry. In 1939 the tonnage per lost-time injury was 125,994; in 1940, 135,276; in 1944, 268,193; and in 1945, 100,523, with an average for these 4 years of 157,496. The accident rate of the tons produced per lost-time injury during these 4 years is very good. The company considers a lost-time injury one that involves loss of time beyond the day the accident occurs.

The accident frequency rate per million man-hours of exposure for the 10-year period ranged from 74.8 to 5.2, with an average for the period of 30.8. The accident frequency rate per million tons produced ranged from 61.4 to 3.7, with an average of 20.5.

The total cost of compensation for the 10-year period was $56,737.51. With a production of 11,273,675 tons of coal, the accident cost per ton of coal produced was $0.005. As compared with some other mines, this cost is exceptionally low.

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The officials and employees of mine No. 7 are commended for the accident record for the 10-year period, and it is believed that the record indicates that coal mines can be operated with a reasonable degree of safety.

The authors wish to express their appreciation for the courtesies shown them by the mine officials and employees of the company, particularly General Manager J. J. Foster and Safety Director A. J. Bartlett.

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